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(54) Title: METHOD OF FORMING THIN SGOI WAFERS WITH HIGH RELAXATION AND LOW STACKING FAULT DEFECT DENSITY

(57) Abstract: A method of forming a silicon germanium on insulator (SGOI) structure. A SiGe layer (104) is deposited (300) on an SOI wafer (102, 100). Thermal mixing of the SiGe and Si layers is performed (302) to form a thick SGOI (106) with high relaxation and low stacking fault defect density. The SiGe layer (110) is then thinned (306) to a desired final thickness. The Ge concentration, the amount of relaxation, and stacking fault defect density are unchanged by the thinning process. A thin SGOI film is thus obtained with high relaxation and low stacking fault defect density. A layer of Si (112) is then deposited on the thin SGOI wafer. The method of thinning includes low temperature (550°C-700°C) HIPOX or steam oxidation, in-situ HCl etching in an epitaxy chamber, or CMP. A rough SiGe surface resulting from HIPOX or steam oxidation thinning is smoothed with a touch-up CMP, in-situ hydrogen bake and SiGe buffer layer during strained Si deposition, or heating the wafer in a hydrogen environment with a mixture of gases HCl, DCS and GeH₄.